



U.S. Department of Energy
Technical Qualification Program

Emergency Management Topical Area

Study Guide

For the

*Mechanical Systems
Qualification Standard*

May 1996



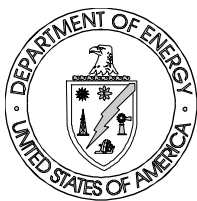
Competency 2.3 Mechanical systems personnel shall demonstrate a familiarity level knowledge of Department of Energy, DOE Order 5000.3, Occurrence Reporting and Processing of Operations Information.

1. Supporting Knowledge and Skills

- a. State the purpose of the Order.
- b. Define the following terms:
 - Event
 - Condition
 - Facility
 - Notification report
 - Occurrence report
 - Reportable occurrence
- c. Discuss the Department's policy regarding the reporting of occurrences as outlined in the Order.
- d. State the different categories of reportable occurrences and discuss each.
- e. Refer to Attachment 1 of Order 5000.3 and discuss the role of electrical systems personnel in electrical systems-related reportable occurrences.

2. Self-Study Activities (corresponding to the intent of the above competency)

- NOTES: • The DOE Orders are in a state of transition. Please refer to the following gopher site for a cross reference of new and old Orders:
gopher://VM1.HQADMIN.DOE.GOV:70/00/doemenu1/directiv/251cross.asc



- Below are two web sites containing many of the references you may need.

Web Sites		
Organization	Site Location	Notes
Department of Energy	http://cted.inel.gov/cted/index.html	DOE Standards, Guides, and Orders.
U.S. House of Representatives	http://law.house.gov/cfr.htm	Searchable Code of Federal Regulations

Read DOE Order 5000.3B, *Occurrence Reporting and Processing of Operations Information*.

Read at least two occurrence reports involving facilities at your site. If possible, these should involve mechanical system activities as at least a contributing factor to the cause of the occurrence.

- EXERCISE 2.3-A State the purpose of DOE Order 5000.3B.
- EXERCISE 2.3-B Define “Reportable Occurrence” and the rationale associated with reporting as identified in DOE Order 5000.3B.
- EXERCISE 2.3-C Referring to DOE Order 5000.3B, describe three categories of Reportable Occurrences and provide an example of the types of events that could lead to each.
- EXERCISE 2.3-D Describe the elements of the occurrence report.
- EXERCISE 2.3-E List three of the seven categories of causes.
- EXERCISE 2.3-F For the two occurrence reports you reviewed, identify and highlight the root cause and corrective action sections. How will facility management know if the corrective action is actually “correct”?

3. Summary

DOE Order 5000.3B, *Occurrence Reporting and Processing of Operations Information*, establishes a system for reporting of operations information related to DOE-owned or -operated facilities and processing of that information to provide for appropriate corrective action.



The Order describes the requirements for reporting and processing of occurrences related to the operation of DOE-owned or -operated facilities, including occurrences related to safety, health, security, property, operations, or the environment, up to and including emergencies.

4. Exercise Solutions

EXERCISE 2.3-A State the purpose of DOE Order 5000.3B.

ANSWER 2.3-A “1. PURPOSE. To establish a system for reporting of operations information related to DOE-owned or operated facilities and processing of that information to provide for appropriate corrective action in accordance with the policy set forth in Paragraph 6 of this Order” (DOE Order 5000.3B).

EXERCISE 2.3-B Define “Reportable Occurrence” and the rationale associated with reporting as identified in DOE Order 5000.3B.

ANSWER 2.3-B Reportable Occurrences are events or conditions that (1) affect the health and safety of the public, (2) seriously impact the intended purpose of DOE facilities, (3) have a noticeable adverse effect on the environment, (4) endanger the health and safety of workers, or (5) adversely affect national security or the security interests of DOE.

EXERCISE 2.3-C Referring to DOE Order 5000.3B, describe three categories of Reportable Occurrences and provide an example of the types of events that could lead to each.

ANSWER 2.3-C Emergencies - The most serious occurrences; require an increased Alert status for on-site personnel and, in specified cases, for off-site authorities. Types of events that could lead to an emergency include the following:

- a) any unintentional nuclear criticality that results or could result in actual or potential facility damage or release of radioactive material to the environment;
- b) any actual or potential release of material to the environment that results or could result in significant off-site consequences;
- c) any natural or man-made event posing an actual or potential threat to the integrity of the facility that results or could result in significant off-site consequences;



- d) any event in process or having occurred that involves an actual or potential substantial degradation of the level of the safety of the facility which results or could result in significant off-site consequences;
- e) any safeguards or security event that is an actual or potential threat to DOE operations, facilities, or personnel, and results or could result in significant effects on the public health and safety/or on national security; or
- f) any event that requires activation of the site emergency plan.

Unusual Occurrence - A nonemergency event that has significant impact or potential for impact on safety, the environment, health, security, or operations. Types of events that could lead to an Unusual Occurrence include events which do the following:

- a) result in the release of radioactive or hazardous materials above limits established in, or in violation of, safety, environmental, or health requirements defined in Federal permits, Federal regulations, or DOE standards;
- b) present significant internal or external threats to safety, the environment, health protection, or the ability of a facility to operate;
- c) involve significant degradation of safety class equipment or environmental, safety, security, or health conditions;
- d) result in fatalities, exposures to hazardous or radioactive materials or off-site or on-site contamination that do not meet emergency criteria defined in DOE Order 5500.2B, but are in excess of regulatory limits, failure of environmental monitoring equipment necessary to demonstrate compliance, failure of safety equipment or systems reducing the capability below a minimum required safety function, or significant delay or cost in operations;
- e) result in the actuation of emergency systems or engineered safety features, except under approved testing;
- f) violate technical safety requirements, or involve an unreviewed safety question;
- g) violate DOE safety requirements, environmental requirements, or result in the loss of control or release of radioactive material above allowable limits;
- h) result in the release of a hazardous substance or material that exceeds a reportable quantity and is not Federally permitted as defined in Attachment I of DOE Order 5000.3B; or
- i) result in failure or significant degradation of administrative controls that are required to ensure safety, security, or environmental protection.



Off-Normal Occurrence - An abnormal or unplanned event or condition that adversely affects, potentially affects, or is indicative of degradation in, the safety, security, environmental, or health protection performance or operation of a facility. Off-Normal Occurrences are those events which do the following:

- a) result in the release of radioactive or hazardous materials below limits established by Federal permits, Federal regulations, or DOE standards, but must be reported in writing to state or local agencies in other than routine monthly/quarterly reports;
- b) are internal or external threats to safety, security, environmental, or health protection or the ability of a facility to operate;
- c) involve degradation of environmental, safety, security, or health conditions;
- d) result in serious personnel injury or significant lost workdays, personnel contamination, assimilation, exposure, or significant on-site or off-site contamination of hazardous or radioactive materials in excess of administrative limits but within regulatory limits, or degradation of environmental monitoring equipment necessary to demonstrate compliance;
- e) result in violation of safety, environmental, or health administrative limits;
- f) involve operational procedural violations, including maintenance and administrative procedures that have the potential to impact the safety, security, environmental, or health performance or operation of a facility; or
- g) involve discovery of a condition that could prevent the functioning of administrative controls necessary to ensure safety or environmental protection.

EXERCISE 2.3-D Describe the required elements of the occurrence report.

ANSWER 2.3-D For every Reportable Occurrence, the Facility Manager shall determine and document the following in the occurrence report:

- a) the significance, nature, and extent of the event or condition;
- b) the cause(s) of the event or condition, including the root cause, as appropriate; and
- c) the corrective actions to be taken to correct the condition and prevent recurrence.



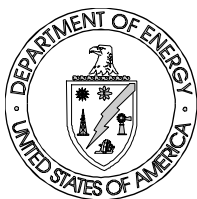
EXERCISE 2.3-E List three of the seven categories of causes.

ANSWER 2.3-E Categories of causes:

1. Equipment/material problem
2. Procedure problem
3. Personnel error
4. Design problem
5. Training deficiency
6. Management problem
7. External phenomenon

EXERCISE 2.3-F For the two occurrence reports you reviewed, identify and highlight the root cause and corrective action sections. How will facility management know if the corrective action is actually “correct”?

ANSWER 2.3-F Primarily by monitoring the corrective action or any performance indicators corresponding to this corrective action; also if the occurrence does not “occur” again.



Competency 4.10 Mechanical systems personnel shall demonstrate the ability to evaluate contractor activities and reports controlled by DOE Order 5000.3, Occurrence Reporting and Processing of Operations Information.

1. Supporting Knowledge and Skills

- a. Using an occurrence report and DOE Order 5000.3 as a reference, determine the following:
 - The adequacy of the review process used
 - Whether causes were appropriately defined
 - Whether corrective actions addressed causes
 - Whether the lessons learned were appropriate
 - Whether corrective actions have been completed
- b. Using an occurrence report involving mechanical systems activities, identify and discuss the factors contributing to the occurrence.

2. Self-Study Activities (corresponding to the intent of the above competency)

- NOTES:
- The DOE Orders are in a state of transition. Please refer to the following gopher site for a cross reference of new and old Orders:
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Read DOE Order 5000.3B, *Occurrence Reporting and Processing of Operations Information*.



Read two or more occurrence reports involving facilities at your site. If possible, these should involve mechanical system activities as at least a contributing factor.

EXERCISE 4.10-A Using an occurrence report and DOE Order 5000.3B as a reference, determine the following:

- That the review process used was adequate
- Whether causes were appropriately defined
- Whether corrective actions addressed causes
- Whether the lessons learned were appropriate
- Whether corrective actions have been completed

3. Summary

DOE Order 5000.3B, *Occurrence Reporting and Processing of Operations Information*, establishes a system for reporting of operations information related to DOE-owned or -operated facilities and processing of that information to provide for appropriate corrective action.

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4. Exercise Solutions

EXERCISE 4.10-A Using an occurrence report and DOE Order 5000.3B as a reference, determine the following:

- That the review process used was adequate
- Whether causes were appropriately defined
- Whether corrective actions addressed causes
- Whether the lessons learned were appropriate
- Whether corrective actions have been completed



ANSWER 4.10-A

Issues	Indicators
Adequacy of the review process	<ul style="list-style-type: none">• Identification and categorization of occurrence were timely.• Notification and reporting to DOE management were timely.• Significance, root causes, generic implications, and the need for corrective actions were addressed.
Causes were appropriately defined	<ul style="list-style-type: none">• At least one direct cause is identified.• No more than three contributing causes are defined.• Complete consideration of the cause is provided, including contributory factors, with analysis to show what cause was root to the occurrence and what causes were only contributory.• One of the seven allowable categories of causes was identified.
Corrective actions addressed causes	<ul style="list-style-type: none">• The corrective actions are directly related to the causes (direct and contributing) defined.
Lessons learned were appropriate	<ul style="list-style-type: none">• Includes only lessons that others might learn from the occurrence which might be important to other facility operators, or which should be addressed in personnel training or facility procedures.• Lessons learned are directly related to the occurrence.
Corrective actions have been completed	<ul style="list-style-type: none">• All actions identified to correct the problem are listed, which completed, will prevent recurrence.• Actual or target completion dates are provided for all the corrective actions listed.